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SPIKE: Application for ASTRO-D Mission Planning

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SPIKE is a mission planning software system developed by a team of programmers at the STScI under the direction of Mark Johnston for use with the Hubble Space Telescope (HST). SPIKE has been developed for the purpose of automating observatory scheduling to increase the effective utilization and ultimately, scientific return from orbiting telescopes. High-level scheduling strategies using both rule-based and neural network approaches have been incorporated. Graphical displays of activities, constraints, and schedules are an important feature of the system.

Although SPIKE was originally developed for the HST, it can be used for other astronomy missions including ground-based observatories. One of the missions that has decided to use SPIKE is ASTRO-D, a Japanese X-ray satellite for which the US is providing a part of the scientific payload. Scheduled to fly in February 1993, its four telescopes will focus X-rays over a wide energy range onto CCDs and imaging gas proportional counters. ASTRO-D will be the first X-ray imaging mission operating over the 0.5-12 keV band with high energy resolution. This combination of capabilities will enable a varied and exciting program of astronomical research to be carried out.

ASTRO-D is expected to observe 5 to 20 objects per day and a total of several thousands per year. This requires a the implementation of an efficient planning and scheduling system which SPIKE can provide.

Although the version of SPIKE that will be used for ASTRO-D mission is almost identical to that used for the HST, there are a few differences. For example, ASTRO-D will use two ground stations for data downlinks, instead of the TDRSS system for data transmission. As a consequence ASTRO-D is constrained by limited on-board data storage capacity to schedule high data-rate observations during periods of frequent ground contacts. The ASTRO-D version of SPIKE will consider this constraint and schedule high bit rate observations accordingly.

We will demonstrate the ASTRO-D version of SPIKE to show what SPIKE can provide and how efficiently it creates an observational schedule.